

## *Ctenosaura similis* Gray (Iguanidae) as a Seed Disperser in a Central American Deciduous Forest

**ABSTRACT.**—*Ctenosaura similis* Gray (Iguanidae) consumes fruits of a variety of plants in the deciduous forest of Santa Rosa National Park, Costa Rica. Seeds of *Acacia farnesiana* (L.) Willd. (Leguminosae) were common in ctenosaur dung during the dry season and proved viable. This lizard probably is a more important seed disperser in the tropical dry forest than previously thought.

### INTRODUCTION

Lizards can act as mutualists of plants by dispersing seeds to favorable sites for germination and growth. This phenomenon, called saurochory by van der Pijl (1972), has been documented only occasionally (Borzi, 1911; Racine and Downhower, 1974; Barquin and de la Torre, 1975; Clifford and Hamley, 1982; Iverson, 1985; Whitaker, 1987; Sylber, 1988; Auffenberg, 1988). In general, data on the specific diets of herbivorous lizards are available from some studies (Auffenberg, 1982; Case, 1982; Smits, 1985; Sylber, 1988), but most published information refers only to a few of the plant species eaten, rarely categorizing them by plant part (Iverson, 1982).

*Ctenosaura similis* (Iguanidae) has been reported previously to consume fruits of *Spondias purpurea* (Fitch and Hackforth-Jones, 1983) and of *Ficus hondurensis* (Roberts and Heithaus, 1986). Viable seeds of *Guazuma ulmifolia* (Janzen, 1982) and "intact" seeds of *Spondias mombin* and *S. purpurea* (Janzen, 1985) have also been found in ctenosaur droppings. During the dry season, adult ctenosaurs eat primarily leaves, flowers and fruits, although their diet also includes small animals (Fitch and Hackforth-Jones, 1983).

This iguanid occurs throughout the deciduous and semievergreen forests and at beach edges along the Pacific coast from southern Mexico to Panama (Fitch and Hackforth-Jones, 1983). All the seeds found in ctenosaur scats, except those of *Acacia farnesiana*, are produced by trees common in the forest where these animals live. *Acacia farnesiana* inhabits open pastures and savannas, and often is found along forest edges.

### METHODS

The study was conducted in Santa Rosa National Park, Guanacaste Province, in northwestern Costa Rica. About 30 ctenosaur scats which contained seeds were collected in different habitats, most of them on and near trails throughout the park. The seeds were extracted and identified.

A sample of 50 seeds of *Acacia farnesiana*, the species most represented in the collected feces, was extracted from four of the droppings to determine their viability. A cut was made with a razor blade in the hard seed coat to speed germination. Seeds were placed on a moist paper towel in petri dishes at 25-30 C and exposed to natural daylight.

### RESULTS AND DISCUSSION

In the upland deciduous forest, intact seeds of the following species were identified in the ctenosaur scats: *Acacia farnesiana* (Leguminosae), *Ficus* spp. (Moraceae), *Spondias purpurea* (Anacardiaceae), *Guazuma ulmifolia* (Sterculiaceae), and *Simarouba glauca* (Simaroubaceae). At the beach edge, droppings of this iguanid were usually found with seeds of the toxic *Hippomane mancinella* (Euphorbiaceae).

On two occasions, scats containing seeds of *Acacia farnesiana* were located ca. 500 m away from any fruiting shrub of this species. This dispersal distance is probably uncommon, yet Fitch and Hackforth-Jones (1983) report that ctenosaurs may make unusually long trips to flowering and fruiting trees during the dry season when food is scarce. At the beach edge, most scats were located below the crowns of *Hippomane mancinella*.

Pods of *Acacia farnesiana* placed in the field were rapidly removed by ctenosaurs (pers. observ.). Up to 176 seeds of this plant were found in a single scat (these seeds would come from ca. 15 pods, since



FIG. 1.—Close-up of a ctenosaur defecation containing seeds (5–7 mm in length) of *Acacia farnesiana*. Four seeds are partially embedded in the dung, and the two in the center bear a bruchid egg on them. Two adult bruchids have already emerged from the two seeds on the left

the average number of seeds per pod is 11,  $n = 75$ ). Droppings usually contained 30–50 seeds of *A. farnesiana*. In all cases, pieces of the pod valves were found in the feces, and sometimes partially opened but whole pods were present with all seeds still inside. All seeds sampled germinated in 1–3 days after being placed in petri dishes.

The seeds of *Acacia farnesiana* in the ctenosaur dung are found by a bruchid beetle, *Stator vachelliae* (Bruchidae), which oviposits on them (Fig. 1). Attacked seeds in ctenosaur droppings were always found near or beneath a fruiting shrub, suggesting that the insects might locate the dung only at a limited distance from the plant. Seeds in reptile dung have not been reported previously to be attacked by insects or by any other kind of seed predator.

Although *Acacia farnesiana* is also dispersed by deer and free-ranging horses in Santa Rosa, the abundant ctenosaurs might be relevant to the maintenance of the plant population. Likewise, the dispersal of other species of plants and the vegetation structure in certain areas might be importantly influenced by these overlooked iguanid lizards.

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